

## CLAIMS

1. A method for facilitating performance of 2-phase commit operations between transaction managers and resource managers in a database cluster, said method comprising the steps of:

5        recording indoubt transaction entries for each member of a database cluster via a shared memory device; and upon detecting failure of a transaction manager,

          issuing instructions to perform a ROLLBACK or COMMIT based upon said recorded indoubt transaction entries in said shared memory device.

10    2. A method for facilitating performance of 2-phase commit operations between transaction managers and resource managers in a database cluster, as per claim 1, wherein said shared memory device is located remote from said database cluster.

3. A method for facilitating performance of 2-phase commit operations between  
15 transaction managers and resource managers in a database cluster, as per claim 1, wherein said method comprises the step of adding an indoubt entry in said shared memory device when a PREPARE TO COMMIT instruction is received by a member of said database cluster from a transaction manager.

20    4. A method for facilitating performance of 2-phase commit operations between transaction managers and resource managers in a database cluster, as per claim 1,

wherein said method comprises the step of deleting an indoubt entry in shared memory device upon successful completion of a COMMIT or ROLLBACK instruction issued by a transaction manager to a member of said database cluster.

5    5. A method for facilitating performance of 2-phase commit operations between transaction managers and resource managers in a database cluster, as per claim 1, wherein, prior to said step of issuing instructions, said method comprises the steps of:

transmitting a list of indoubt entries in said shared memory device to said transaction manager; and

10        receiving a RECOVER instruction from said transaction manager, wherein said transaction manager receives said list of indoubt entries, identifies associated indoubt entries in said list, transmits a COMMIT or ROLLBACK instruction for said associated indoubt entries to said database system, and notifies owners of remainder of indoubt entries in said list.

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6. A method for facilitating performance of 2-phase commit operations between transaction managers and resource managers in a database cluster, as per claim 1, wherein said recorded indoubt entries in said coupling facility list structure comprise: a global transaction identifier, a timestamp identifying when an entry was created, and a  
20    state indicating that a transaction is indoubt.

7. A method for facilitating performance of 2-phase commit operations between transaction managers and resource managers in a database cluster, as per claim 1, wherein members of said database cluster additionally maintain a log recording COMMIT, ROLLBACK, and RECOVER instructions.

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8. A method for facilitating performance of 2-phase commit operations between transaction managers and resource managers in a database cluster, as per claim 7, wherein in the event of loss of data in said shared memory device, data sharing groups restart processing to reconstruct indoubt entries from said maintained log.

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9. A method for facilitating performance of 2-phase commit operations between transaction managers and resource managers in a database cluster, as per claim 1, wherein wherein communication link between said shared memory device and transaction managers are established over a network.

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10. A method for facilitating performance of 2-phase commit operations between transaction managers and resource managers in a database cluster, as per claim 1, wherein said network is any of, or a combination of: a local area network (LAN), a wide area network, a wireless network, or the Internet.

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11. A coupling facility recording indoubt transaction entries for each member of a remote database system, said coupling facility comprising:

a) a coupling facility list structure recording indoubt entries associated with one or more members in said database system;

5        b) an interface for communicating with said database cluster and a transaction manager, said interface issuing instructions to perform a ROLLBACK or COMMIT based upon said recorded indoubt transaction entries in said coupling facility list structure.

10    12. A coupling facility recording indoubt transaction entries for each member of a remote database system, as per claim 11, wherein an indoubt entry is added in said coupling facility list structure when a PREPARE TO COMMIT instruction is received by said database system from said transaction manager.

15    13. A coupling facility recording indoubt transaction entries for each member of a remote database system, as per claim 11, wherein an indoubt entry is deleted in said coupling facility list structure upon successful completion of a COMMIT or ROLLBACK instruction issued by said transaction manager to said database system.

20    14. A coupling facility recording indoubt transaction entries for each member of a remote database system, as per claim 11, wherein, upon a network failure, a list of

indoubt entries in said coupling facility list structure is sent to said transaction manager after receiving a RECOVER instruction, whereupon said transaction manager receiving said list of indoubt entries: identifies associated indoubt entries in said list, transmits a COMMIT or ROLLBACK instruction for said associated indoubt entries to said database system, and notifies owners of remainder of indoubt entries in said list.

15. A coupling facility recording indoubt transaction entries for each member of a remote database system, as per claim 11, wherein said recorded indoubt entries in said coupling facility list structure comprise: a global transaction identifier, a timestamp identifying when an entry was created, and a state indicating that a transaction is indoubt.

16. A coupling facility recording indoubt transaction entries for each member of a remote database system, as per claim 11, wherein said database system additionally maintains a log recording commit, rollback, and recover instructions.

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17. A coupling facility recording indoubt transaction entries for each member of a remote database system, as per claim 16, wherein in the event of loss of data in said coupling facility list structure, data sharing groups restart processing to reconstruct said coupling facility list structure from said maintained log.

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18. A coupling facility recording indoubt transaction entries for each member of a remote database system, as per claim 11, wherein communication link between said coupling facility and said transaction manager is established over a network.

5 19. A coupling facility recording indoubt transaction entries for each member of a remote database system, as per claim 18, wherein said network is any of, or a combination of: a local area network (LAN), a wide area network, a wireless network, or the Internet.

10 20. A coupling facility recording indoubt transaction entries for each member of a remote database system, as per claim 11, wherein more than one coupling facility list structures are used to improve the integrity of the coupling facility.

21. A coupling facility recording indoubt transaction entries for each member of a  
15 remote database system, as per claim 11, wherein said coupling facility is implemented as a memory device shared between said members of said remote database system.

22. A method as implemented in a coupling facility operatively linking, over a network, a database cluster with one or more transaction managers, said method comprising the  
20 steps of:

(a) creating a coupling facility list structure in said coupling facility;

(b) receiving an instruction from a member in said database cluster to create an entry in said coupling facility list structure, said instruction sent by said member in said database cluster after receiving a PREPARE TO COMMIT message regarding a transaction from a transaction manager;

5       (c) creating said entry corresponding to said transaction in said coupling facility list structure, said entry comprising a global transaction identifier, a timestamp identifying when said entry was created, and a state indicating that said transaction is an indoubt transaction;

          wherein created entries in said coupling facility list structure are used to perform  
10   COMMIT or ROLLBACK operations in said database cluster.

23. A method as per claim 22, wherein said method additionally comprises the steps of deleting said entry corresponding to said transaction upon successful completion of either a COMMIT or ROLLBACK decision in said database cluster;

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24. A method as per claim 23, wherein, if communication link between said coupling facility and database cluster or if communication link between said coupling facility and transaction manager failed, then said coupling facility:

          reestablishing communication links,

20       receiving a RECOVER message from said transaction manager,

transmitting a list of said global transaction identifiers to said transaction manager, wherein said transaction manager identifies associated indoubt entries, issues a COMMIT or ROLLBACK decision for said associated indoubt entries, and notifies other transaction managers corresponding to remainder of indoubt entries; and

wherein, upon successful execution of said issued COMMIT or ROLLBACK decision, said coupling facility receiving an instruction from a member in said database cluster for deleting corresponding entry in coupling facility list structure.

10 25. A method as per claim 22, wherein said network is any of, or a combination of: a local area network (LAN), a wide area network, a wireless network, or the Internet.

26. A method as per claim 22, wherein more than one coupling facility list structures are used to improve the integrity of the coupling facility.

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27. A method as per claim 22, wherein members of said database cluster additionally maintain a log recording COMMIT, ROLLBACK, and RECOVER instructions.

28. A method as per claim 27, wherein in the event of loss of data in said coupling facility list structure, data sharing groups restart processing to reconstruct said coupling facility list structure from said maintained log.

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29. A method as per claim 22, wherein said coupling facility is implemented as a memory device shared between said members of said remote database cluster.

5 30. An article of manufacture comprising computer usable medium having computer readable program code embodied therein facilitating performance of 2-phase commit operations between transaction managers and resource managers in a database cluster, said medium comprising:

(a) computer readable program code recording indoubt transaction entries for  
10 each member of a database cluster via a shared memory device; and upon detecting failure of a transaction manager,

(b) computer readable program code issuing instructions to perform a ROLLBACK or COMMIT based upon said recorded indoubt transaction entries in said shared memory device.

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31. An article of manufacture as per claim 30, wherein said medium further comprises computer readable program code to add an indoubt entry in said shared memory device when a PREPARE TO COMMIT instruction is received by a member of said database cluster from a transaction manager.

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32. An article of manufacture as per claim 30, wherein said medium further comprises computer readable program code to delete an indoubt entry in shared memory device upon successful completion of a COMMIT or ROLLBACK instruction issued by a transaction manager to a member of said database cluster.

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33. An article of manufacture as per claim 30, wherein said medium further comprises:

computer readable programmable code aiding in transmitting a list of indoubt entries in said shared memory device to said transaction manager; and

computer readable program code aiding in receiving a RECOVER instruction  
10 from said transaction manager, wherein said transaction manager receives said list of indoubt entries, identifies associated indoubt entries in said list, transmits a COMMIT or ROLLBACK instruction for said associated indoubt entries to said database system, and notifies owners of remainder of indoubt entries in said list.

15 34. An article of manufacture as per claim 30, wherein said medium further comprises computer readable program code additionally maintains a log recording COMMIT, ROLLBACK, and RECOVER instructions.

35. An article of manufacture as per claim 34, wherein said medium further comprises  
20 computer readable program code restarting processing to reconstruct indoubt entries from said maintained log in the event of loss of data in said shared memory device.